

WHAT IS CLAIMED IS:

1. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, and a reflection plate provided on a lower surface of said optical control layer through a transparent electrode provided as a second electrode,

wherein said optical control layer changes in refractive index by an electric field applied by said first electrode and said second electrode, shows a refractive index substantially same as or greater than that of said plate-shaped light guide when no electric field is applied and shows a small refractive index as compared with said plate-shaped light guide when an electric field is applied, and

said reflection plate is made of a light transmissive material, a reflection surface of said reflection plate is angled at a predetermined angle with respect to a surface thereof on said optical control layer side, and a reflection film is formed on said reflection surface.

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2. The optical device as claimed in Claim 1, wherein said reflection surface comprises a sawtooth angled surface group having a predetermined inclination angle.

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3. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, and a reflection plate made of a light transmissive plate provided on a lower surface of said optical control layer through a second electrode comprising said transparent electrode,

15 wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal changing in scattering degree by an electric field applied by said first electrode and said second electrode, which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and  
20 said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

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4. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, and a second electrode which is an electrode provided on a lower surface of said optical control layer for making mirror reflection of light,

wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal changing in scattering degree by an electric field applied by said first electrode and said second electrode, which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

5. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, and a reflection plate made of a light transmissive plate provided on a lower surface of said

optical control layer through a transparent electrode provided as a second electrode,

wherein said optical control layer changes in diffraction ability by an electric field applied by said first electrode and said second electrode.

6. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, and a second electrode which is an electrode provided on a lower surface of said optical control layer for making mirror reflection of light,

wherein said optical control layer changes in diffraction ability by an electric field applied by said first electrode and said second electrode.

7. The optical device as claimed in Claim 5, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas, wherein

said liquid crystal has a structure periodically distributed in the form of a diffraction grating.

8. The optical device as claimed in Claim 6, wherein  
5 said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid  
10 crystal in which respective polymer resin area and liquid crystal area form continuous areas, wherein  
said liquid crystal has a structure periodically distributed in the form of a diffraction grating.

15 9. The optical device as claimed in Claim 5, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal.

10. The optical device as claimed in Claim 6, wherein  
20 said optical control layer comprises a holographic polymer dispersed liquid crystal.

11. The optical device as claimed in Claim 5, wherein  
said optical control layer is made of a reverse mode  
25 polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal

in a liquid crystalline polymer, and said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

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12. The optical device as claimed in Claim 6, wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal  
10 in a liquid crystalline polymer, and said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

15 13. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first  
20 electrode, a second electrode provided on a lower surface of said optical control layer, and a substrate provided on a lower surface of said second electrode,

wherein at least one of said first electrode and said second electrode has

a periodic structure for inducing a fine periodic structure for light diffraction in said optical control layer, and

5       said optical control layer changes in refractive index or absorptivity or scattering degree by an electric field applied by said first electrode and said second electrode.

14. The optical device as claimed in Claim 1, wherein  
10   at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes  
15   constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

20   15. The optical device as claimed in Claim 2, wherein at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second electrode comprise electrode groups divided into  
25   strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality



of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

5 16. The optical device as claimed in Claim 3, wherein at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second electrode comprise electrode groups divided into  
10 strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

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17. The optical device as claimed in Claim 4, wherein at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second  
20 electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each  
25 other.



18. The optical device as claimed in Claim 5, wherein at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

19. The optical device as claimed in Claim 6, wherein at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

20. The optical device as claimed in Claim 10, wherein at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second

electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

21. The optical device as claimed in Claim 1, wherein one of said first electrode and second electrode is divided into display pixel units and each of said divided display pixel units has a switching device.

22. The optical device as claimed in Claim 2, wherein one of said first electrode and second electrode is divided into display pixel units and each of said divided display pixel units has a switching device.

23. The optical device as claimed in Claim 3, wherein one of said first electrode and second electrode is divided into display pixel units and each of said divided display pixel units has a switching device.

24. The optical device as claimed in Claim 4, wherein one of said first electrode and second electrode is divided into display pixel units and each of said divided display pixel units has a switching device.

25. The optical device as claimed in Claim 5, wherein one of said first electrode and second electrode is divided into display pixel units and each of said  
5 divided display pixel units has a switching device.

26. The optical device as claimed in Claim 6, wherein one of said first electrode and second electrode is divided into display pixel units and each of said  
10 divided display pixel units has a switching device.

27. The optical device as claimed in Claim 10, wherein one of said first electrode and second electrode is divided into display pixel units and each of said  
15 divided display pixel units has a switching device.

28. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided  
20 on a lower surface of said plate-shaped light guide, periodic electrodes having periodic structures disposed in alternation and provided on a lower surface of said optical control layer for inducing a fine periodic structure for light diffraction in said  
25 optical control layer, and a substrate provided on a

lower surface of said periodic electrodes disposed in alternation,

wherein said optical control layer changes in refractive index or absorptivity or scattering degree by an electric field applied by said periodic electrodes disposed in alternation.

29. The optical device as claimed in Claim 28, wherein said electrode having periodic electrodes disposed in alternation is provided for each of display pixel units, and each of said divided display pixel units has a switching device.

30. An optical device comprising: a light transmissive plate-shaped light guide for guiding light incident from an end surface; an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode; a second electrode having a plurality of divided electrodes, and a plurality of third electrodes one to one corresponding to each of said plurality of divided second electrodes and penetrating through said substrate,

wherein said optical control layer changes in refractive index or absorptivity or scattering degree

by an electric field applied by said first electrode and said second electrode,

each of said plurality of third electrodes has a first end part connecting to said second electrode and a second end part exposed to a surface opposite to said  
5 second electrode side surface of said substrate, and

said respective electrodes are capable of being applied with a voltage from said substrate side discretely or dividedly in an optional number of  
10 groups.

31. An optical device comprising: a light transmissive plate-shaped light guide for guiding light incident from an end surface; a first stacked  
15 body integrated with an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode; and a second stacked body integrated with each of substrate divided into a plurality of units,

20 wherein said second stacked body corresponds one to one to each of said second electrode divided into a plurality of units and a substrate provided on a lower surface of said electrode, has a plurality of third electrodes penetrating through said substrate, and  
25 arranged on a lower surface of said optical control layer,

said optical control layer changes in refractive index or absorptivity or scattering degree by an electric field applied by said first electrode and second electrode,

5 each of said plurality of third electrodes has a first end part connecting to said second electrode and a second end part exposed to a surface opposite to said second electrode side of said substrate, and said respective electrodes are capable of being applied  
10 with a voltage from said substrate side discretely or dividedly in an optional number of groups.

32. A display apparatus comprising an optical device and a illumination means for applying light to said  
15 optical device, wherein

said optical device has an end surface for incident light from said illumination means, a light transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on  
20 a lower surface of said plate-shaped light guide and changing in refractive index by an electric field applied through a transparent electrode provided as a first electrode, and a reflection plate provided on a lower surface of said optical control layer through  
25 a transparent electrode provided as a second electrode,

wherein said optical control layer has a liquid crystal exhibiting a refractive index substantially same as or greater than that of said plate-shaped light guide when no electric field is applied and a small  
5 refractive index as compared with said plate-shaped light guide when an electric field is applied, and

said reflection plate is made of a light transmissive material, a reflection surface of said reflection plate opposite to said optical control  
10 layer side is angled at a predetermined angle with respect to a side surface of said optical control layer, and a reflection film is provided on said reflection surface.

15 33. The display apparatus as claimed in Claim 32, wherein said reflection surface comprises a sawtooth angled surface group having a predetermined inclination angle.

20 34. A display apparatus comprising an optical device and a illumination means for applying light to said optical device, wherein

said optical device has an end surface for incident light from said illumination means, a light  
25 transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on



a lower surface of said plate-shaped light guide, and a reflection plate made of a light transmissive plate provided on a lower surface of said optical control layer through a transparent electrode provided as a  
5 second electrode,

wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal changing in scattering degree by an electric field applied by said first electrode and said second electrode, which  
10 is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric  
15 field is applied.

35. A display apparatus comprising an optical device and a illumination means for applying light to said optical device, wherein

20 said optical device has an end surface for incident light from said illumination means, a light transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on a lower surface of said plate-shaped light guide  
25 through a transparent electrode provided as a first electrode, and a second electrode provided as an

electrode on a lower surface of said optical control layer for making mirror reflection of light,

wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal changing  
5 in scattering degree by an electric field applied by said first electrode and said second electrode, which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform  
10 birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

36. A display apparatus comprising an optical device  
15 and a illumination means for applying light to said optical device, wherein

said optical device has an end surface for incident light from said illumination means, a light transmissive plate-shaped light guide for guiding  
20 incident light, an optical control layer provided on a lower surface of said plate-shaped light guide, and a reflection plate made of a light transmissive plate provided on a lower surface of said optical control layer through a transparent electrode provided as a  
25 second electrode,

wherein said optical control layer changes in diffraction ability by an electric field applied by said first electrode and said second electrode.

- 5 37. A display apparatus comprising an optical device and a illumination means for applying light to said optical device,

said optical device has an end surface for incident light from said illumination means, a light  
10 transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, and a second electrode provided as an  
15 electrode on a lower surface of said optical control layer for making mirror reflection of light,

wherein said optical control layer changes in diffraction ability by an electric field applied by said first electrode and said second electrode.

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38. The display apparatus as claimed in Claim 36, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid  
25 crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid

crystal in which respective polymer resin area and liquid crystal area form continuous areas, wherein said liquid crystal has a structure periodically distributed in the form of a diffraction grating.

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39. The display apparatus as claimed in Claim 37, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas, wherein said liquid crystal has a structure periodically distributed in the form of a diffraction grating.

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40. The display apparatus as claimed in Claim 36, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal.

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41. The display apparatus as claimed in Claim 37, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal.

25 42. The display apparatus as claimed in Claim 36, wherein said optical control layer is made of a reverse

mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform  
5 birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

43. The display apparatus as claimed in Claim 37,  
10 wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform  
15 birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

44. A display apparatus comprising an optical device  
20 and a illumination means for applying light to said optical device;

said optical device having an end surface for incident light from said illumination means, a light transmissive plate-shaped light guide for guiding  
25 incident light, an optical control layer provided on a lower surface of said plate-shaped light guide

through a transparent electrode provided as a first electrode, a periodic electrode provided as a second electrode having a periodic structure provided on a lower surface of said optical control layer for  
5 inducing a fine periodic structure for light diffraction in said optical control layer, and a substrate provided on a lower surface of said second electrode,

wherein at least one of said first electrode and  
10 said second electrode has a periodic structure for inducing a fine periodic structure for light diffraction in said optical control layer, and

said optical control layer changes in refractive  
15 index or absorptivity or scattering degree by an applied electric field, and is made of a reverse mode polymer dispersed liquid crystal changing in refractive index or absorptivity or scattering degree by an electric field applied by said first electrode  
20 and said second electrode, which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering  
25 state when an electric field is applied.

45. The display apparatus as claimed in Claim 32,  
wherein at least one of said first electrode and second  
electrode comprises an electrode group divided into  
strips, when both of said first electrode and second  
5 electrode comprise electrode groups divided into  
strips, said plurality of strip-formed electrodes  
constituting said first electrode and said plurality  
of strip-formed electrodes constituting said second  
electrodes are disposed to be perpendicular to each  
10 other.

46. The display apparatus as claimed in Claim 33,  
wherein at least one of said first electrode and second  
electrode comprises an electrode group divided into  
strips, when both of said first electrode and second  
15 electrode comprise electrode groups divided into  
strips, said plurality of strip-formed electrodes  
constituting said first electrode and said plurality  
of strip-formed electrodes constituting said second  
20 electrodes are disposed to be perpendicular to each  
other.

47. The display apparatus as claimed in Claim 34,  
wherein at least one of said first electrode and second  
25 electrode comprises an electrode group divided into  
strips, when both of said first electrode and second



electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

48. The display apparatus as claimed in Claim 35, wherein at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

49. The display apparatus as claimed in Claim 36, wherein at least one of said first electrode and second electrode comprises an electrode group divided into strips, when both of said first electrode and second electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second

electrodes are disposed to be perpendicular to each other.

50. The display apparatus as claimed in Claim 37,  
5 wherein at least one of said first electrode and second  
electrode comprises an electrode group divided into  
strips, when both of said first electrode and second  
electrode comprise electrode groups divided into  
strips, said plurality of strip-formed electrodes  
10 constituting said first electrode and said plurality  
of strip-formed electrodes constituting said second  
electrodes are disposed to be perpendicular to each  
other.

15 51. The display apparatus as claimed in Claim 44,  
wherein at least one of said first electrode and second  
electrode comprises an electrode group divided into  
strips, when both of said first electrode and second  
electrode comprise electrode groups divided into  
20 strips, said plurality of strip-formed electrodes  
constituting said first electrode and said plurality  
of strip-formed electrodes constituting said second  
electrodes are disposed to be perpendicular to each  
other.

52. The display apparatus as claimed in Claim 32,  
wherein at least one of said first electrode and second  
electrode is divided into display pixel units, and each  
of said divided display pixel units has a switching  
5 device.

53. The display apparatus as claimed in Claim 33,  
wherein at least one of said first electrode and second  
electrode is divided into display pixel units, and each  
10 of said divided display pixel units has a switching  
device.

54. The display apparatus as claimed in Claim 34,  
wherein at least one of said first electrode and second  
15 electrode is divided into display pixel units, and each  
of said divided display pixel units has a switching  
device.

55. The display apparatus as claimed in Claim 35,  
20 wherein at least one of said first electrode and second  
electrode is divided into display pixel units, and each  
of said divided display pixel units has a switching  
device.

25 56. The display apparatus as claimed in Claim 36,  
wherein at least one of said first electrode and second

electrode is divided into display pixel units, and each of said divided display pixel units has a switching device.

5 57. The display apparatus as claimed in Claim 37, wherein at least one of said first electrode and second electrode is divided into display pixel units, and each of said divided display pixel units has a switching device.

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58. The display apparatus as claimed in Claim 44, wherein at least one of said first electrode and second electrode is divided into display pixel units, and each of said divided display pixel units has a switching  
15 device.

59. A display apparatus comprising an optical device and a illumination means for applying light to said optical device;

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said optical device having an end surface for incident light from said illumination means, a light transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on a lower surface of said plate-shaped light guide, an  
25 electrode having periodic electrodes with a periodic structure provided on a lower surface of said optical

control layer for inducing a fine periodic structure for light diffraction in said optical control layer, and a substrate provided on a lower surface of said electrode having periodic electrodes disposed in alternation.

wherein said optical control layer changes in refractive index or absorptivity or scattering degree by an electric field applied by said periodic electrodes disposed in alternation.

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60. The display apparatus as claimed in Claim 59, wherein said electrode having periodic electrodes disposed in alternation is provided for each of display pixel units, and each of said display pixel units has a switching device.

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61. A display apparatus comprising an optical device and a illumination means for applying light to said optical device;

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said optical device having an end surface for incident light from said illumination means, a light transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, a second electrode provided on a lower

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surface of said optical control layer and comprising  
an electrode divided into a plurality of units, and  
a plurality of third electrodes corresponding one to  
one to each of said plurality of divided second  
5 electrodes and penetrating through said substrate,

wherein said optical control layer changes in  
refractive index or absorptivity or scattering degree  
or diffraction ability by an electric field applied  
by said first electrode and said second electrode,  
10 each of said plurality of third electrodes has a  
first end part connecting to said second electrode and  
a second end part exposed to a surface opposite to said  
second electrode side of said substrate, and said  
respective electrodes are capable of being applied  
15 with a voltage from said substrate side discretely or  
dividedly in an optional number of groups.

62. A display apparatus comprising an optical device  
and a illumination means for applying light to said  
20 optical device;

said optical device having an end surface for  
incident light from said illumination means, a light  
transmissive plate-shaped light guide for guiding  
incident light, a first stacked body integrated with  
25 an optical control layer provided on a lower surface  
of said plate-shaped light guide through a transparent

electrode provided as a first electrode, and a second stacked body integrated with each of substrate divided into a plurality of units,

wherein said second stacked body corresponds one to one to each of said second electrode divided into a plurality of units and a substrate provided on a lower surface of said second electrode and said plurality of divided second electrodes, has a plurality of third electrodes penetrating through said substrate, and arranged on a lower surface of said optical control layer,

said optical control layer changes in refractive index or absorptivity or scattering degree or diffraction ability by an electric field applied by said first electrode and said second electrode,

each of said plurality of third electrodes has a first end part connecting to said second electrode and a second end part exposed to a surface opposite to said second electrode side of said substrate, and said respective electrodes are capable of being applied with a voltage from said substrate side discretely or dividedly in an optional number of groups.

63. The display apparatus as claimed in Claim 32, wherein said illumination means has at least a red light source, a blue light source, and a green light



source, and further comprising means for successively switching said red light source, blue light source and green light source in synchronization with display image.

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64. The display apparatus as claimed in Claim 33, wherein said illumination means has at least a red light source, a blue light source, and a green light source, and further comprising means for successively  
10 switching said red light source, blue light source and green light source in synchronization with display image.

65. The display apparatus as claimed in Claim 34,  
15 wherein said illumination means has at least a red light source, a blue light source, and a green light source, and further comprising means for successively switching said red light source, blue light source and green light source in synchronization with display  
20 image.

66. The display apparatus as claimed in Claim 35, wherein said illumination means has at least a red light source, a blue light source, and a green light  
25 source, and further comprising means for successively switching said red light source, blue light source and

green light source in synchronization with display image.

67. The display apparatus as claimed in Claim 36,  
5 wherein said illumination means has at least a red  
light source, a blue light source, and a green light  
source, and further comprising means for successively  
switching said red light source, blue light source and  
10 green light source in synchronization with display  
image.

68. The display apparatus as claimed in Claim 37,  
wherein said illumination means has at least a red  
light source, a blue light source, and a green light  
15 source, and further comprising means for successively  
switching said red light source, blue light source and  
green light source in synchronization with display  
image.

20 69. The display apparatus as claimed in Claim 44,  
wherein said illumination means has at least a red  
light source, a blue light source, and a green light  
source, and further comprising means for successively  
switching said red light source, blue light source and  
25 green light source in synchronization with display  
image.

70. The display apparatus as claimed in Claim 59,  
wherein said illumination means has at least a red  
light source, a blue light source, and a green light  
5 source, and further comprising means for successively  
switching said red light source, blue light source and  
green light source in synchronization with display  
image.

10 71. The display apparatus as claimed in Claim 60,  
wherein said illumination means has at least a red  
light source, a blue light source, and a green light  
source, and further comprising means for successively  
switching said red light source, blue light source and  
15 green light source in synchronization with display  
image.

72. The display apparatus as claimed in Claim 61,  
wherein said illumination means has at least a red  
20 light source, a blue light source, and a green light  
source, and further comprising means for successively  
switching said red light source, blue light source and  
green light source in synchronization with display  
image.

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73. The display apparatus as claimed in Claim 62,  
wherein said illumination means has at least a red  
light source, a blue light source, and a green light  
source, and further comprising means for successively  
5 switching said red light source, blue light source and  
green light source in synchronization with display  
image.

74. An optical device comprising a light transmissive  
10 plate-shaped light guide for guiding light incident  
from an end surface, an optical control layer provided  
on a lower surface of said plate-shaped light guide  
through a transparent electrode provided as a first  
electrode, a reflection film provided on a lower  
15 surface of said optical control layer, a second  
electrode provided on a lower surface of said  
reflection film, and a substrate provided on a lower  
surface of said second electrode,

wherein said optical control layer changes in  
20 scattering degree or diffraction efficiency by an  
electric field applied by said first electrode and said  
second electrode,

75. The optical device as claimed in Claim 74, further  
25 comprising a light absorption film disposed between  
said reflection film and said second electrode.

76. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said light guide through a transparent electrode provided as a first electrode, and a transparent electrode provided as a second electrode provided on a lower surface of said optical control layer,

wherein said optical control layer changes in scattering degree or diffraction efficiency by an electric field applied by said first electrode and said second electrode.

77. The optical device as claimed in Claim 76, further comprising a light absorption film provided on a lower surface of said reflection film.

78. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, a reflection film provided on a lower surface of said optical control layer, a second electrode provided on a lower surface of said

reflection film, and a substrate provided on a lower surface of said second electrode,

wherein at least one of said first electrode and said second electrode has

5 a periodic structure for inducing a fine periodic structure for light diffraction in said optical control layer, and

said optical control layer changes in refractive index or scattering degree or absorbance by an electric field applied by said first electrode and said second electrode.

79. The optical device as claimed in Claim 78, further comprising a light absorption film disposed between  
15 said reflection film and said second electrode.

80. The optical device as claimed in Claim 74 or 75, wherein at least one of said first electrode and said second electrode comprises an electrode group divided  
20 into strips, when both of said first electrode and said second electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second  
25 electrodes are disposed to be perpendicular to each other.

81. The optical device as claimed in Claim 76 or 77,  
wherein at least one of said first electrode and said  
second electrode comprises an electrode group divided  
5 into strips, when both of said first electrode and said  
second electrode comprise electrode groups divided  
into strips, said plurality of strip-formed electrodes  
constituting said first electrode and said plurality  
of strip-formed electrodes constituting said second  
10 electrodes are disposed to be perpendicular to each  
other.

82. The optical device as claimed in Claim 78 or 79,  
wherein at least one of said first electrode and said  
15 second electrode comprises an electrode group divided  
into strips, when both of said first electrode and said  
second electrode comprise electrode groups divided  
into strips, said plurality of strip-formed electrodes  
constituting said first electrode and said plurality  
20 of strip-formed electrodes constituting said second  
electrodes are disposed to be perpendicular to each  
other.

83. The optical device as claimed in Claim 74 or 75,  
25 wherein at least one of said first electrode and said  
second electrode is divided into display pixel units,



and each of said divided display pixel units has a switching device.

84. The optical device as claimed in Claim 76 or 77,  
5 wherein at least one of said first electrode and said second electrode is divided into display pixel units, and each of said divided display pixel units has a switching device.

10 85. The optical device as claimed in Claim 78 or 79, wherein at least one of said first electrode and said second electrode is divided into display pixel units, and each of said divided display pixel units has a switching device.

15

86. An optical device comprising a light transmissive plate-shaped light guide for guiding light incident from an end surface, an optical control layer provided on a lower surface of said plate-shaped light guide,  
20 a reflection film provided on a lower surface of said optical control layer, an electrode comprising periodic electrodes having periodic structures disposed in alternation and provided on a lower surface of said reflection film for inducing a fine periodic  
25 structure for light diffraction in said optical control layer, and a substrate provided on a lower

surface of said electrode having periodic electrodes disposed in alternation.

wherein said optical control layer changes in refractive index or scattering degree or absorbance  
5 by an electric field applied by said electrode having periodic electrodes disposed in alternation.

87. The optical device as claimed in Claim 86, further comprising a light absorption film disposed between  
10 said reflection film and said electrode having periodic electrodes disposed in alternation.

88. The optical device as claimed in Claim 86 or 87, wherein said electrode having periodic electrodes  
15 disposed in alternation is provided for each of display pixel units, and each of said divided display pixel units has a switching device.

89. An optical device comprising: a light  
20 transmissive plate-shaped light guide for guiding light incident from an end surface; an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode; a reflection film provided on  
25 a lower surface of said optical control layer, a second electrode divided into a plurality of electrodes

provided on a lower surface of said reflection film,  
a substrate provided on a lower surface of said second  
electrode, and a plurality of third electrodes one to  
one corresponding to each of said plurality of divided  
5 second electrodes and penetrating through said  
substrate,

wherein said optical control layer changes in  
refractive index or absorptivity or scattering degree  
or diffraction ability by an electric field applied  
10 by said first electrode and said second electrode,

each of said plurality of third electrodes has a  
first end part connecting to said second electrode and  
a second end part exposed to a surface opposite to said  
second electrode side surface of said substrate, and  
15 said respective electrodes are capable of being  
applied with a voltage from said substrate side  
discretely or dividedly in an optional number of  
groups.

20 90. The optical device as claimed in Claim 89, further  
comprising a light absorption film disposed between  
said reflection film and said second electrode.

91. An optical device comprising: a light  
25 transmissive plate-shaped light guide for guiding  
light incident from an end surface; a first stacked

body integrated with an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, and a second stacked body integrated with  
5 each of substrate divided into a plurality of units,

wherein said second stacked body has a reflection film, a second electrode divided into a plurality of units, a substrate provided on a lower surface of said second electrode, and a plurality of third electrodes  
10 corresponding one to one to each of said plurality of second electrode, penetrating through said substrate, and arranged on a lower surface of said optical control layer,

said optical control layer changes in refractive  
15 index or absorptivity or scattering degree or diffraction ability by an electric field applied by said first electrode and said second electrode,

each of said plurality of third electrodes has a first end part connecting to said second electrode and  
20 a second end part exposed to a surface opposite to said second-electrode side of said substrate, and said respective electrodes are capable of being applied with a voltage from said substrate side discretely or dividedly in an optional number of groups.

92. The optical device as claimed in Claim 91, further comprising a light absorption film disposed between said reflection film and said second electrode.

5 93. The optical device as claimed in Claim 74 or 75, wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and  
10 said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

15 94. The optical device as claimed in Claim 76 or 77, wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and  
20 said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

25 95. The optical device as claimed in Claim 78 or 79, wherein said optical control layer is made of a reverse

mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform  
5 birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

96. The optical device as claimed in Claim 86 or 87,  
10 wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform  
15 birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

97. The optical device as claimed in Claim 89 or 90,  
20 wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform  
25 birefringent thin film when no electric field is

applied and becomes a scattering state when an electric field is applied.

98. The optical device as claimed in Claim 91 or 92,  
5 wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform  
10 birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

99. The optical device as claimed in Claim 74 or 75,  
15 wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid  
20 crystal in which respective polymer resin area and liquid crystal area form continuous areas.

100. The optical device as claimed in Claim 76 or 77,  
wherein said optical control layer comprises one of  
25 constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid



crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas.

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101. The optical device as claimed in Claim 78 or 79, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas.

15 102. The optical device as claimed in Claim 86 or 87, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas.

25 103. The optical device as claimed in Claim 89 or 90, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed

in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and  
5 liquid crystal area form continuous areas.

104. The optical device as claimed in Claim 91 or 92, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed  
10 in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas.

15 105. The optical device as claimed in Claim 74 or 75, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal of liquid crystal area having a structure periodically  
20 distributed in the form of a diffraction grating.

106. The optical device as claimed in Claim 76 or 77, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal of liquid  
25 crystal area having a structure periodically distributed in the form of a diffraction grating.

107. The optical device as claimed in Claim 78 or 79,  
wherein said optical control layer comprises a  
holographic polymer dispersed liquid crystal of liquid  
5 crystal area having a structure periodically  
distributed in the form of a diffraction grating.

108. The optical device as claimed in Claim 86 or 87,  
wherein said optical control layer comprises a  
10 holographic polymer dispersed liquid crystal of liquid  
crystal area having a structure periodically  
distributed in the form of a diffraction grating.

109. The optical device as claimed in Claim 89 or 90,  
15 wherein said optical control layer comprises a  
holographic polymer dispersed liquid crystal of liquid  
crystal area having a structure periodically  
distributed in the form of a diffraction grating.

20 110. The optical device as claimed in Claim 91 or 92,  
wherein said optical control layer comprises a  
holographic polymer dispersed liquid crystal of liquid  
crystal area having a structure periodically  
distributed in the form of a diffraction grating.

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111. The optical device as claimed in Claim 74 or 75,  
wherein said reflection film comprises one selected  
from:

- a dielectric multilayered film; and
- 5 a film lower in refractive index than said light  
guide.

112. The optical device as claimed in Claim 76 or 77,  
wherein said reflection film comprises one selected  
10 from:

- a dielectric multilayered film; and
- a film lower in refractive index than said light  
guide.

15 113. The optical device as claimed in Claim 78 or 79,  
wherein said reflection film comprises one selected  
from:

- a dielectric multilayered film; and
- a film lower in refractive index than said light  
20 guide.

114. The optical device as claimed in Claim 86 or 87,  
wherein said reflection film comprises one selected  
from:

- 25 a dielectric multilayered film; and

a film lower in refractive index than said light guide.

115. The optical device as claimed in Claim 89 or 90,  
5 wherein said reflection film comprises one selected from:

a dielectric multilayered film; and

a film lower in refractive index than said light guide.

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116. The optical device as claimed in Claim 91 or 92,  
wherein said reflection film comprises one selected from:

a dielectric multilayered film; and

15 a film lower in refractive index than said light guide.

117. A display apparatus comprising an optical device  
and a illumination means for applying light to said  
20 optical device,

said optical device having an end surface for  
incident light from said illumination means, a light  
transmissive plate-shaped light guide for guiding  
incident light, an optical control layer provided on  
25 a lower surface of said light guide through a  
transparent electrode provided as a first electrode,

a reflection film provided on a lower surface of said optical control layer, a second electrode provided on a lower surface of said reflection film, and a substrate provided on a lower surface of said second electrode,

wherein said optical control layer changes in scattering degree or diffraction efficiency by an electric field applied by said first electrode and said second electrode.

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118. The display apparatus as claimed in Claim 117, further comprising a light absorption film disposed between said reflection film and said second electrode.

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119. A display apparatus comprising an optical device and a illumination means for applying light to said optical device,

said optical device having an end surface for incident light from said illumination means, a light transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, a reflection film provided on a lower surface of said optical control layer through a

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transparent electrode provided as a second electrode,  
and a substrate provided on a lower surface of said  
reflection film,

5 wherein said optical control layer changes in  
scattering degree or diffraction efficiency by an  
electric field applied by said first electrode and said  
second electrode.

120. The display apparatus as claimed in Claim 119,  
10 further comprising a light absorption film provided  
on a lower surface of said reflection film.

121. A display apparatus comprising an optical device  
and a illumination means for applying light to said  
15 optical device,

said optical device having an end surface for  
incident light from said illumination means, a light  
transmissive plate-shaped light guide for guiding  
incident light, an optical control layer provided on  
20 a lower surface of said light guide through a  
transparent electrode provided as a first electrode,  
a reflection film provided on a lower surface of said  
optical control layer, a second electrode provided on  
a lower surface of said reflection film, and a  
25 substrate provided on a lower surface of said second  
electrode,



wherein at least one of said first electrode and  
said second electrode has  
a periodic structure for inducing a fine periodic  
structure for light diffraction in said optical  
5 control layer, and

said optical control layer changes in refractive  
index or scattering degree or absorbance by an electric  
field applied by said first electrode and said second  
electrode.

10

122. The display apparatus as claimed in Claim 121,  
further comprising a light absorption film disposed  
between said reflection film and said second  
electrode.

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123. The display apparatus as claimed in Claim 117 or  
118, wherein at least one of said first electrode and  
said second electrode comprises an electrode group  
divided into strips, when both of said first electrode  
20 and said second electrode comprise electrode groups  
divided into strips, said plurality of strip-formed  
electrodes constituting said first electrode and said  
plurality of strip-formed electrodes constituting  
said second electrodes are disposed to be  
25 perpendicular to each other.

124. The display apparatus as claimed in Claim 119 or 120, wherein at least one of said first electrode and said second electrode comprises an electrode group divided into strips, when both of said first electrode and said second electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

125. The display apparatus as claimed in Claim 121 or 122, wherein at least one of said first electrode and said second electrode comprises an electrode group divided into strips, when both of said first electrode and said second electrode comprise electrode groups divided into strips, said plurality of strip-formed electrodes constituting said first electrode and said plurality of strip-formed electrodes constituting said second electrodes are disposed to be perpendicular to each other.

126. The display apparatus as claimed in Claim 117 or 118, wherein at least one of said first electrode and said second electrode is divided into display pixel

units, and each of said divided display pixel units has a switching device.

127. The display apparatus as claimed in Claim 119 or  
5 120, wherein at least one of said first electrode and said second electrode is divided into display pixel units, and each of said divided display pixel units has a switching device.

10 128. The display apparatus as claimed in Claim 121 or 122, wherein at least one of said first electrode and said second electrode is divided into display pixel units, and each of said divided display pixel units has a switching device.

15 129. A display apparatus comprising an optical device and a illumination means for applying light to said optical device,

said optical device having an end surface for  
20 incident light from said illumination means, a light transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on a lower surface of said plate-shaped light guide, a reflection film provided on a lower surface of said  
25 optical control layer, an electrode comprising periodic electrodes disposed in alternation having a

periodic structure provided on a lower surface of said reflection film for inducing a fine periodic structure for light diffraction in said optical control layer, and a substrate provided on a lower surface of said electrodes disposed in alternation,

wherein said optical control layer changes in refractive index or scattering degree or absorbance by an electric field applied by said periodic electrodes disposed in alternation.

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130. The display apparatus as claimed in Claim 129, further comprising a light absorption film disposed between said reflection film and said electrode having periodic electrodes disposed in alternation.

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131. The display apparatus as claimed in Claim 129 or 130, wherein said electrode having periodic electrodes disposed in alternation is provided for each of display pixel units, and each of said display pixel units has a switching device.

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132. A display apparatus comprising: an optical device, a illumination means for applying light to said optical device,

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said optical device having an end surface for incident light from said illumination means, a light

transmissive plate-shaped light guide for guiding incident light, an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent electrode provided as a first electrode, a reflection film provided on a lower surface of said optical control layer, a second electrode comprising an electrode divided into a plurality of units provided on a lower surface of said reflection film, a substrate provided on a lower surface of said second electrode, and a plurality of third electrodes corresponding one to one to each of said plurality of second electrode, penetrating through said substrate,

wherein said optical control layer changes in refractive index or absorptivity or scattering degree or diffraction ability by an electric field applied by said first electrode and said second electrode,

each of said plurality of third electrodes has a first end part connecting to said second electrode and a second end part exposed to a surface opposite to said second electrode side of said substrate, and said respective electrodes are capable of being applied with a voltage from said substrate side discretely or dividedly in an optional number of groups.

133. The display apparatus as claimed in Claim 132, further comprising a light absorption film disposed between said reflection film and said second electrode.

5

134. A display apparatus comprising: an optical device, a illumination means for applying light to said optical device,

said optical device having an end surface for  
10 incident light from said illumination means, a light transmissive plate-shaped light guide for guiding incident light, a first stacked body integrated with an optical control layer provided on a lower surface of said plate-shaped light guide through a transparent  
15 electrode provided as a first electrode, and a second stacked body integrated with each of substrate divided into a plurality of units,

wherein said second stacked body has a reflection film, a second electrode divided into a plurality of  
20 units provided on a lower surface of said reflection film, a substrate provided on a lower surface of said plurality of divided second electrodes, and a plurality of third electrodes corresponding one to one to each of said plurality of divided second electrodes,  
25 penetrating through said substrate, and arranged on a lower surface of said optical control layer,

said optical control layer changes in refractive index or absorptivity or scattering degree or diffraction ability by an electric field applied by said first electrode and said second electrode,

5 each of said plurality of third electrodes has a first end part connecting to said second electrode and a second end part exposed to a surface opposite to said second electrode side of said substrate, and said respective electrodes are capable of being applied  
10 with a voltage from said substrate side discretely or dividedly in an optional number of groups.

135. The display apparatus as claimed in Claim 134, further comprising a light absorption film provided  
15 between said reflection film and said second electrode.

136. The display apparatus as claimed in Claim 117 or 118, wherein said optical control layer is made of a  
20 reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform  
birefringent thin film when no electric field is  
25 applied and becomes a scattering state when an electric field is applied.



137. The display apparatus as claimed in Claim 119 or 120, wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

138. The display apparatus as claimed in Claim 121 or 122, wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

139. The display apparatus as claimed in Claim 129 or 130, wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and

said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

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140. The display apparatus as claimed in Claim 132 or 133, wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and  
10 said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

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141. The display apparatus as claimed in Claim 134 or 135, wherein said optical control layer is made of a reverse mode polymer dispersed liquid crystal which is constructed by dispersing a low molecular-weight liquid crystal in a liquid crystalline polymer, and  
20 said optical control layer becomes a uniform birefringent thin film when no electric field is applied and becomes a scattering state when an electric field is applied.

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142. The display apparatus as claimed in Claim 117 or 118, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed  
5 in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas.

10 143. The display apparatus as claimed in Claim 119 or 120, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed  
15 in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas.

144. The display apparatus as claimed in Claim 121 or  
20 122, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid  
25 crystal in which respective polymer resin area and liquid crystal area form continuous areas.

145. The display apparatus as claimed in Claim 129 or 130, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas.

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146. The display apparatus as claimed in Claim 132 or 133, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid crystal in which respective polymer resin area and liquid crystal area form continuous areas.

20 147. The display apparatus as claimed in Claim 134 or 135, wherein said optical control layer comprises one of constructions of liquid crystal particles dispersed in a polymer resin area, a polymer dispersed liquid crystal comprising polymer resin particles dispersed in a liquid crystal, and a polymer dispersed liquid

25

crystal in which respective polymer resin area and liquid crystal area form continuous areas.

148. The display apparatus as claimed in Claim 117 or  
5 118, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal of liquid crystal area having a structure periodically distributed in the form of a diffraction grating.

10 149. The display apparatus as claimed in Claim 119 or 120, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal of liquid crystal area having a structure periodically distributed in the form of a diffraction grating.

15  
150. The display apparatus as claimed in Claim 121 or 122, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal of liquid crystal area having a structure periodically  
20 distributed in the form of a diffraction grating.

151. The display apparatus as claimed in Claim 129 or 130, wherein said optical control layer comprises a holographic polymer dispersed liquid crystal of liquid  
25 crystal area having a structure periodically distributed in the form of a diffraction grating.

152. The display apparatus as claimed in Claim 132 or  
133, wherein said optical control layer comprises a  
holographic polymer dispersed liquid crystal of liquid  
5 crystal area having a structure periodically  
distributed in the form of a diffraction grating.

153. The display apparatus as claimed in Claim 134 or  
135, wherein said optical control layer comprises a  
10 holographic polymer dispersed liquid crystal of liquid  
crystal area having a structure periodically  
distributed in the form of a diffraction grating.

154. The display apparatus as claimed in Claim 117 or  
15 118, wherein said reflection film comprises a film  
lower in refractive index than a dielectric  
multilayered film or said light guide.

155. The display apparatus as claimed in Claim 119 or  
20 120, wherein said reflection film comprises a film  
lower in refractive index than a dielectric  
multilayered film or said light guide.

156. The display apparatus as claimed in Claim 121 or  
25 122, wherein said reflection film comprises a film

lower in refractive index than a dielectric multilayered film or said light guide.

157. The display apparatus as claimed in Claim 129 or  
5 130, wherein said reflection film comprises a film lower in refractive index than a dielectric multilayered film or said light guide.

158. The display apparatus as claimed in Claim 132 or  
10 133, wherein said reflection film comprises a film lower in refractive index than a dielectric multilayered film or said light guide.

159. The display apparatus as claimed in Claim 134 or  
15 135, wherein said reflection film comprises a film lower in refractive index than a dielectric multilayered film or said light guide.

160. The display apparatus as claimed in Claim 117 or  
20 118, wherein said illumination means has at least a red light source, a blue light source, and a green light source, and further comprising means for successively switching said red light source, blue light source and green light source in synchronization with display  
25 image.



161. The display apparatus as claimed in Claim 119 or 120, wherein said illumination means has at least a red light source, a blue light source, and a green light source, and further comprising means for successively  
5 switching said red light source, blue light source and green light source in synchronization with display image.

162. The display apparatus as claimed in Claim 121 or  
10 122, wherein said illumination means has at least a red light source, a blue light source, and a green light source, and further comprising means for successively switching said red light source, blue light source and green light source in synchronization with display  
15 image.

163. The display apparatus as claimed in Claim 129 or 130, wherein said illumination means has at least a red light source, a blue light source, and a green light  
20 source, and further comprising means for successively switching said red light source, blue light source and green light source in synchronization with display image.

25 164. The display apparatus as claimed in Claim 132 or 133, wherein said illumination means has at least a

red light source, a blue light source, and a green light source, and further comprising means for successively switching said red light source, blue light source and green light source in synchronization with display  
5 image.

165. The display apparatus as claimed in Claim 134 or 135, wherein said illumination means has at least a red light source, a blue light source, and a green light  
10 source, and further comprising means for successively switching said red light source, blue light source and green light source in synchronization with display image.